CLAIMS

1. A VCO device comprising:

a plurality of VCO circuits for oscillating signals of frequencies corresponding to a control voltage applied to a frequency control voltage terminal, in different oscillation frequency ranges;

a current source circuit for respectively setting a driving current of each of oscillation transistors included in the plurality of VCO circuits;

a signal selecting means for switching output signals of the VCO circuits;

a PLL for frequency-dividing a local signal selected by the signal selecting means, comparing a phase thereof with a phase of a reference signal and outputting a signal converted from a phase difference; and

a loop filter for smoothing the output signal from the PLL and outputting the control voltage for controlling the oscillation frequency.

2. The VCO device according to claim 1, wherein in order to equalize phase noises of the plurality of VCO circuits, based on a phase noise of an oscillation signal of a VCO circuit oscillating in a highest oscillation frequency range in the VCO circuits, current values of current source circuits of other VCO circuits are set.

3. The VCO device according to claim 1, wherein the current source circuit is a variable current source circuit.

4. The VCO device according to any one of claims 1 to 3, comprising a current control means for switching current of the variable current source circuit corresponding to the oscillation frequency output from the VCO circuit.

5. The VCO device according to any one of claims 1 to 4, wherein oscillation frequencies, which are output from the plurality of VCO circuits respectively, partially overlap with each other and can be varied continuously into a required oscillation frequency range.

6. The VCO device according to any one of claims 1 to 5, wherein each of the plurality of VCO circuits has substantially equal oscillation sensitivities by a change in the control voltage applied to the frequency control voltage terminal and a change in oscillation frequency corresponding to this control voltage.

7. The VCO device according to any one of claims 1 to 6, comprising:

a plurality of VCO circuits for oscillating signals at different frequencies corresponding to a control voltage applied to a frequency control voltage terminal;

a variable current source circuit for respectively setting a driving current of each of the plurality of VCO circuits;

a high frequency signal processing means comprising a MIX circuit connected to output signals from the plurality of VCO circuits and a high frequency input signal selecting means;

a signal selecting means for switching the output signals of the VCO circuits;

a PLL for frequency-dividing a local signal selected by the signal selecting means, comparing a phase thereof with a phase of a reference signal and outputting a voltage signal converted from a phase difference; and

a loop filter for smoothing the output signal from the PLL and outputting the control voltage for controlling the oscillation frequency.

8. The VCO device according to claim 7, wherein the high frequency input signal selecting means comprises a low noise amplifier, and further the low noise amplifier has a power supply ON/OFF function.

9. The VCO device according to claim 8, wherein the high frequency input signal selecting means comprises a low noise amplifier and has a BPF circuit disposed at a former part or a latter part or both at the former part and the latter part of the low noise amplifier; the low noise amplifier has a power supply ON/OFF function; and further the BPF circuit has a tuning function capable of selecting frequencies.

10. The VCO device according to any one of claims 3 to 9, comprising:

a plurality of VCO circuits for oscillating signals of frequencies corresponding to a control voltage applied to a frequency control voltage terminal, in different oscillation frequency ranges;

a variable current source circuit for respectively setting a driving current of each of the plurality of VCO circuits;

a high frequency signal processing means for mixing a local signal output from any one of the plurality of VCO circuits and a received signal input from a high frequency signal input terminal;

a received characteristics judging means for carrying out a digital demodulation processing of an analog signal output from the high frequency signal processing means so as to judge received characteristics; and

a current control means for switching currents of the variable current source circuit by outputting voltage or current corresponding to the digital signal output from the received characteristics judging means.